

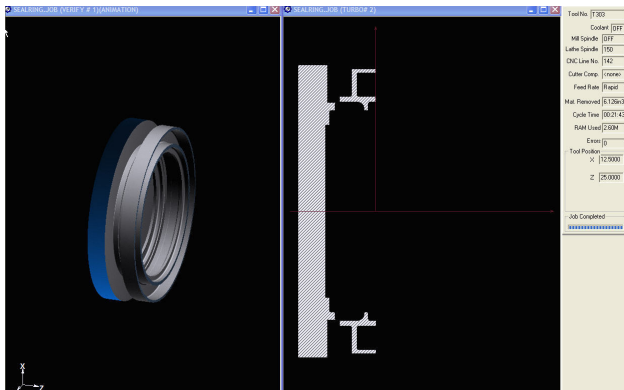
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# M1 Abrams Seal Ring

NCDMM Project No. 03-0009-09

## PROBLEM / OBJECTIVE

The US Army's Anniston Depot in Anniston, AL, is designated the Center of Technical Excellence for the M1 Abrams Tank division of the Tank-Auto and Armaments Command (TAACOM). The Depot was commissioned to reduce the manufacturing time of a housing seal for the M1 Abrams engine. The 3.650"-dia., 0.500"-wide seal, made of wrought A-286 nickel-iron super alloy, is difficult to clamp securely during machining, making it a challenge to maintain required roundness tolerances. Anniston was turning the seal in four set-ups on a lathe, and then employing a machining center to mill off two tabs as required in the part specifications. The Depot requested the assistance of the National Center for Defense Manufacturing and Machining (NCDMM) to help reduce machining costs and improve work holding effectiveness.



The NCDMM created a "Proof-of-Concept" process using Predator verification software supplied by Com 1 Information Technologies

## ACCOMPLISHMENTS / PAYOFF

### Process Improvement

The NCDMM recommended application of cutting tools from alliance partner Kennametal Inc. featuring advanced coatings and geometries. The new tooling permitted a doubling of cutting speeds as well as an increase in depth of cut, reducing machining time and cost. In addition, new fixturing configurations produced strong gripping power without distorting the part. The fixtures enabled the turning operations to be completed in a single clamping, saving time spent handling and relocating the part for multiple setups.



Actual Seal Ring Component

### Implementation and Technology Transfer

The tooling and fixturing improvements enabled the Depot to reduce overall machining costs without investing in new capital equipment. After feed rate was increased in proportion to cutting speed and depth of cut to balance chip load, machining time for the seal ring dropped from 60 minutes to 20 minutes, a 66 percent reduction in cycle time.

### Expected Benefits

In summary, implementation produced:

- An approximately 100 percent increase in machining speeds.
- Improved confidence in the integrity of the work holding system, permitting the component to be machined in one clamping.

The current production rate of 2,080 components per year has now been increased to 5,460 components per year, an increase of 250 percent. Less quantifiable but nevertheless real further savings include lower scrap rates for out-of-specification parts, and reduced expenditure of energy in the manufacturing of the seal rings.

## TIME LINE / MILESTONE

Start Date ..... March 04  
End Date ..... April 04

## PROJECT FUNDING

NCDMM funding ..... \$6K

## PARTICIPANTS

Anniston Army Depot / TAACOM  
Com 1 Information Technologies  
Kennametal Inc.

*For additional information concerning this project, contact the NCDMM at [www.ncdmm.org](http://www.ncdmm.org)*